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Lovers in Paratexts: Oronce Fine's Republic of Mathematics

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Abstract

In the 1520s, Oronce Fine addressed a “republic of mathematics.” The term captured Fine’s goals for an emerging discipline. Fine, the first professor of mathematics of the *Collège Royal* in Paris (est. 1530), turned to the language of *amicitia* and scholarly love to make space in the Republic of Letters for mathematics. Such language drew on an ethics of scholarly love which animated his predecessors in Paris, the circle of Jacques Lefèvre d’Étaples. This article considers Fine and his colleagues’ efforts to imagine a public—and so reimagine a discipline—using the language of love in the letters, poems, and other paratexts that layered the technical books he authored. The vantage point of mathematical studies shows how practitioners could use the notion of *amateur* to garner support for their discipline while levelling social distinctions.

Keywords

Oronce Fine; mathematics; *amicitia*

In 1526 Oronce Fine (1494-1555), an ambitious lecturer of mathematics at the Collège de Navarre in Paris, introduced a new astronomical instrument as an offering to the “republic of mathematics,” as he called it. “Wanting to serve the republic of mathematics as my ability allowed, and to help devotees of astronomy in whatever way I could, I thought up and finally published this equatorium of the planets [...]”¹

¹ Oronce Fine, *Aequatorium planetarum, unico instrumento comprehensum* (Paris: Nicolas Calceolarius, 1526), sig. A2r–v. This letter is edited in Emmanuel Poulle, *Equatoires et horlogerie planétaire du XIIIe au XVIe siècle* (Droz and Champion: Geneva and Paris, 1980), vol. 2, p. 753. “Itaque, vir rarissime, rempublicam mathematicam pro nostra virili parte facilitare et studiosos astornomiae utcunque

Who were the denizens of this republic of mathematics? In recent decades, historians have begun to unravel the default view of early sixteenth-century mathematics in Paris: that there was little to see, less to say. We used to think this because sixteenth-century scholars said so. Philip Melanchthon wrote in 1549 that “the disciplines of mathematics are not so well studied in France—in fact, some of our students might earn their living by teaching mathematics in France.”² The Germanophilic Peter Ramus took up a similar line in his polemical history of mathematics, the *Proemium mathematicum* (1567), paying homage to England and Scotland (Book I), Germany (Book II), Italy, Spain and Portugal (Book III)—but saying nothing of his native France.³

juvare cupientes, presens excogitavimus et tandem edidimus planetarum equatorium...”

² Reijer Hooykaas, *Humanisme, Science et Réforme: Pierre de La Ramée (1515-1572)* (Leiden: Brill, 1958), p. 84; Jean-Claude Margolin, “L’enseignement des mathématiques en France (1540-70): Charles de Bovelles, Fine, Peletier, Ramus,” in *French Renaissance Studies, 1540-70: Humanism and the Encyclopedia*, edited by Peter Sharratt (Edinburgh: Edinburgh University Press, 1976), p. 112. “In Gallia non tanta sunt studia Mathematicum. Imo aliqui ex nostris Auditoribus, in Gallia docentes Mathemata, hoc labore se sustentarunt.” In C. G. Bretschneider, ed., *Philippi Melanthonis Opera*, Corpus Reformatorum VII (Halle: Schwetschke and Son, 1879), ep. 4639, col. 514.

³ Isabelle Pantin, “Teaching Mathematics and Astronomy in France: The Collège Royal (1550-1650),” *Science & Education*, 2006, 15:189-207, pp. 194-195. On Ramus’ histories of mathematics see Robert Goulding, “Method and Mathematics: Peter Ramus’ Histories of the Sciences,” *Journal of the History of Ideas*, 2006,

Yet in the 1520s Fine not only wrote of a mathematical republic, but identified some of its members. He put himself in a tradition of eminent astronomical instrument makers such as Willem Gilliszoon, Jean de Lignières, and Johannes Regiomontanus.⁴ He also acknowledged friends in Paris. He had used a rectangular version of the instrument with Denis Loiseau, “my friend”; likewise, he had seen a copper version together with his “friend and family” Jacques Staffet.⁵ Strangely, the names of contemporaries disappear in the 1538 edition of the same aequatorium. The letter was reproduced, almost word for word, including the reference to a mathematical republic. But now it was peopled only by dead authorities. Why did Fine decide to remove references to other devotees of mathematics? Perhaps he had less need of credit by 1538; he had been given the royal lectureship of mathematics in 1531, taking a place among the *lecteurs royaux* Guillaume Budé had worked so long to establish. Perhaps he was wary of unsafe friends, in a suspicious confessional climate after the *Affair des Placards* of 1534.⁶ Whatever the reason, the example

67(1):63–85; Robert Goulding, *Defending Hypatia: Ramus, Savile, and the Renaissance Rediscovery of Mathematical History* (New York: Springer, 2010).

⁴ On these, see Poulle, *Equatoires* (cit. note 1), *passim*.

⁵ Poulle, *Equatoires* (cit. note 1), vol. 2, p. 753. “...quod a Dionysio Loysello amico nostro frequenter habuimus atque similibus observatur...quod quidem aequatorium ex aurichalco fabrefactum apud Jacobus Staffetum amicum et familiarem nostrum vidimus...”

⁶ A document from 29 January 1536 associates one of these names with heresy: “Absolution d'hérésie accordée à Jacques Staffet, docteur en médecine à Aix, par Pierre Le Filleul, archevêque d'Aix et René du Bellay, son vicaire général, au nom de Jean du Bellay, cardinal et évêque de Paris” (*Bibliothèque de la Sorbonne*, MS 2047,

reveals Fine's canny mechanism of inclusion and exclusion, encapsulating a moment when the rhetoric of *amateurs* was used to imagine a republic of mathematics.

This is a case study in how a practitioner of an uncertain assortment of arts expressed *amicitia* in order to extend their warrant and credibility—or, as I shall call it, authority. I prefer the word “authority” because this process is inseparable from developing modes of authorial control in print. In print, Fine self-consciously stretched the language of amateurs to include his practical mathematics within a culture of learned friendship. This article will trace how this language framed Fine's mathematical works before it faded among mathematicians in the later sixteenth century.

Fine's Paratextual Authority

With his mathematical republic Fine gestured, of course, towards the Republic of Letters so often invoked in humanist correspondence since Francesco Barbaro used the term in 1417.⁷ Anthony Grafton has warmly described this notional republic as an

fol. 9). Though practicing in Aix, it is possible this Jacques Staffet had studied medicine—and so mathematics—in Paris.

⁷ To my knowledge, this is the first use of the phrase. Elizabeth Eisenstein, *The Printing Press as an Agent of Change: Communications and Cultural Transformations in Early-Modern Europe* (Cambridge: Cambridge University Press, 1979), 1:137. Reflections on the term include: Marc Fumaroli, “The Republic of Letters,” *Diogenes*, 1988, 143:129–154; Françoise Waquet, “Qu'est-ce que la République des Lettres? Essai de sémantique historique,” *Bibliothèque de l'École des Chartes*, 1989, 147(1):473–502.

edifice or a “lost continent.”⁸ If the centres of this notional community are clear, its edges may be fuzzy, though informally policed by its members.⁹ The *respublica literarum* was largely coextensive with a culture of reading, whether in books, letters, or newsletters. Therefore the phrase was a chiefly a tool of inclusion; someone like Fine could use it to wave his reader into his hoped-for public—to make the reader a friend, as I elaborate in the next section.

If there was a European republic of mathematics, Fine was one of its aristocrats.¹⁰ The son of a physician who had also enjoyed mathematical studies, Fine

⁸ Anthony T. Grafton, “A Sketch Map of a Lost Continent: The Republic of Letters,” *Republic of Letters* 2009, 1(1). Republished in Anthony Grafton, *Worlds Made by Words: Scholarship and Community in the Modern West* (Cambridge, MA: Harvard University Press, 2009), pp. 1-34. For a critique of such rich metaphors as saying more than they explain, see Caspar Hirschi, “Republicans of Letters, Memory Politicians, Global Colonialists: Historians in Recent Histories of Historiography,” *The Historical Journal*, 2012, 55(3):857–81.

⁹ The behaviours of a later republic of letters were described by Anne Goldgar, *Impolite Learning: Conduct and Community in the Republic of Letters, 1680-1750* (New Haven: Yale University Press, 1995). On the France in the sixteenth century, see George Huppert, *The Style of Paris: Renaissance Origins of the French Enlightenment* (Bloomington, IN: Indiana University Press, 1999).

¹⁰ Alexander Marr (ed.), *The Worlds of Oronce Fine. Mathematics, Instruments and Print in Renaissance France* (Donington: Shaun Tyas, 2009); Angela Axworthy, “Le Statut des mathématiques en France au XVIe siècle: le cas d’Oronce Fine,” (PhD thèse, Université de François-Rabelais, 2011, revised and forthcoming as *Le*

probably earned his MA in 1516 at the Collège de Navarre, where he taught mathematics and astronomy for most of his life.¹¹ When he was made the first *lecteur royal* in mathematics in 1531, his fame spread. This was not effortless intellectual aristocracy; Fine's life was marked by financial hardship and even in later life he had to petition for payment of his salary. The need to feed his large family likely fueled his diverse projects as an instrument-maker, illustrator, editor and author of mathematical works from maps to clocks to astronomy manuals.¹² Such output in Paris, the largest exporter of printed books in the early sixteenth century, combined with his prestigious position, made Fine famous throughout Europe.¹³ No one has done more than Isabelle Pantin to understand how Fine brought about a French tradition of astronomical books and illustrations.¹⁴ In particular, she has outlined with

Mathématicien renaissant et son savoir. Le statut des mathématiques selon Oronce Fine, Paris: Classique Garnier).

¹¹ Richard Ross, "The Mathematical Works of Oronce Finé" (PhD dissertation, Columbia University, 1971), p. 17.

¹² Ross, "Mathematical Works of Fine" (cit. note. 11), pp. 26–29.

¹³ Henrique Leitão has astutely observed that it was precisely Fine's prominence that earned him the energetic critique of the next generation of mathematicians. Leitão, "Pedro Nunes against Oronce Fine: Content and Context of a Refutation," in *The Worlds of Oronce Fine*, edited by Marr (cit. note 10), pp. 156–171.

¹⁴ Isabelle Pantin, "L'illustration des livres d'astronomie à la renaissance: l'évolution d'une discipline à travers ses images," in *Immagini per conoscere: Dal Rinascimento alla Rivoluzione scientifica*, edited by Fabrizio Meroi and Claudio Pogliano (Firenze: Leo S. Olschki, 2001), pp. 3–42; Isabelle Pantin, "Oronce Fine's Role as Royal Lecturer," in *The Worlds of Oronce Fine*, edited by Marr (cit. note 10), pp. 13–30;

acute insight how the bibliography of editions that Fine edited and illustrated themselves contributed to the shape, prestige, and audience of mathematics in the early sixteenth century.¹⁵

We can scrutinize that same bibliography for the material traces of Fine's efforts to project a readership—his “republic of mathematics.”¹⁶ Fine's extended bibliography yields further insights when we pay special attention to the traces of his authorship in paratexts. Paratexts are the “liminal” bits of text or figure which frame

Isabelle Pantin, “Altior incubuit animus sub imagine mundi. L'inspiration du cosmographe d'après un gravure d'Oronce Finé,” in *Les méditations cosmographiques à la Renaissance* (Paris: Presses de l'Université Paris-Sorbonne, 2009), pp. 69-90; Isabelle Pantin, “The Astronomical Diagrams in Oronce Fine's Protomathesis (1532): Founding a French Tradition?” *Journal for the History of Astronomy*, 2010, 41(3): 287–310.

¹⁵ Isabelle Pantin, “Oronce Finé mathématicien et homme du livre: la pratique éditoriale comme moteur d'évolution,” in *Mise en forme des savoirs à la Renaissance : A la croisée des idées, des techniques et des publics*, edited by Isabelle Pantin and Gérard Péoux (Paris: Armand Colin, 2013), pp. 19-40.

¹⁶ The bibliography of Fine's works remains D. Hillard and Emmanuel Poulle, “Oronce Fine et l'horloge planétaire de la Bibliothèque Sainte-Genevieve,” *Bibliothèque d'Humanisme et Renaissance* 33 (1971): 311–51; Richard P. Ross, “Oronce Fine's Printed Works: Additions to Hillard and Poulle's Bibliography,” *Bibliothèque d'Humanisme et Renaissance* 36, no. 1 (1974): 83–85. See also Ross, “Mathematical Works of Oronce Finé,” (cit. note. 11), Appendix II. A classic justification of my approach is D. F. McKenzie, *Bibliography and the Sociology of Texts* (1986; Cambridge: Cambridge University Press, 1999).

the main blocks of type making up the “body” of a book. The obvious examples are title pages, prefatory letters, indices, and colophons forming what Gérard Genette called the “thresholds” that lead in and out of books; they shape the reader’s expectations and understanding of the text and set the printed book within its communities of authorship, affiliation, and credit.¹⁷

Fine’s paratexts are especially interesting, precisely because much of his career was as editor and illustrator—the two roles responsible for paratexts besides the typesetter. The books Fine illustrated, along with his beautiful maps, have repeatedly been singled out as outstanding examples of the printer’s art, especially because of his connections to the preeminent printer of learned books in Paris from the 1520s through the 1550s, the Estienne dynasty under Simon de Colines and then Robert Estienne.¹⁸ Fine was unusually creative in the ways he asserted editorial

¹⁷ As a fundamental feature of early books that was constantly in flux, paratexts are an enormous topic in early print (even if the term is disputed). For some of the fundamental problems: Gérard Genette, *Paratexts: Thresholds of Interpretation*, translated by Jane E. Lewin (Cambridge: Cambridge University Press, 1997); William H. Sherman, “The Beginning of ‘The End’: Terminal Paratext and the Birth of Print Culture,” in *Renaissance Paratexts*, edited by Helen Smith and Louise Wilson (Cambridge: Cambridge University Press, 2011), pp. 65–87.

¹⁸ Robert Brun, *Le livre illustré en France au XVI^e siècle* (Paris: Felix Alcan, 1930); Robert Brun, “Un illustrateur méconnu: Oronce Finé,” *Arts et métiers graphiques*, 1934, 41:51–57. Harvard’s Houghton Library remains one of the strongest collections of Fine’s work, because its early collectors prized it deeply. E.g. relevant entries in Ruth Mortimer, ed., *French 16th-Century Books*, 2 vols. (Cambridge, MA: Belknap, 1964).

control and announced his own presence in texts. In his earliest works, we know about his involvement in the earliest work from poems, dedicatory letters, and colophons that either he or friends wrote in praise of his work. Even in books with few other paratexts, Fine's involvement can be inferred from his personal motto, *virtus vulnere virescit*, often on the first or last page of the book.¹⁹ The same function is served by distinctive ornate vines (hedera) which decorate many woodcuts he designed.

[insert Figure 1 here]

Figure 1. Bovelles, *Geométrie pratique* [ed. Fine] (Paris: Chaudière, 1551), Cambridge University Library Syn.5.55.7, 49v, detail of the hedera typical of Fine's technical illustrations. The woodblocks for this publication were used already in the first edition of 1542.

Many early printed books do not indicate their editor; Fine made certain that his did. Even though illustrations or motto are sometimes all we know of his editorial work, these are distinctive enough to set his productions apart from most early modern illustrators and editors. A remarkable example is his 1521 edition of Jacques Lefèvre d'Étaples' *Textus de Sphaera*. The famous printer Henri Estienne had reprinted book several times since it first appeared in 1495 with its distinctive commentary and diagrams. In 1521 Simon de Colines, who had just taken over the press from Estienne's widow, assumed his own place in the Estienne dynasty with a

¹⁹ E.g. on the last page of Michel Fine, *Succincta et utilissima preservatio epidemie seu febris pestilente*, edited by Oronce Fine (Paris: s.n., 1522).

new, elegant edition of this visually ambitious book.²⁰ He hired the young Fine to design new woodcuts; Fine likely also wrote the marginal annotations. In all probability, Fine was constrained. In previous editions he had overseen, he had included his name in the extended title and the colophon, or at least included poems making clear his responsibility. But this edition was intended to demonstrate Coline's fidelity to the earlier textual tradition; the original visual schema was necessary to the book's integrity; and Lefèvre was still alive in Paris, so Fine could hardly assert a strong editorial presence.²¹ If this was his predicament, his solution in the 1527 edition was masterful. He designed a luxurious new title page—and placed himself on it, lying at full length in the grass, contemplating the stars.²²

[insert Figure 2 here]

Figure 2. Lefèvre, *Textus de sphaera* (Paris: Simon de Colines, 1538) Lefèvre1527 - Houghton f EC-Sa147S-1527, title page in which Fine set himself at full length below the celestial “type of the universal sphere”.

²⁰ The place of this book within the Estienne dynasty is given by Fred Schreiber and Jeanne Veyrin-Forrer, *Simon de Colines: An Annotated Catalogue of 230 Examples of His Press, 1520-1546* (London: Oak Knoll Press, 1995).

²¹ Editions produced elsewhere, such as those from Venice (1499, 1508, 1531), closely follow the original visual program.

²² See the iconographical reading of this engraving by Isabelle Pantin, “Altior incubuit animus sub imagine mundi. L’inspiration du cosmographe d’après un gravure d’Oronce Finé,” in *Les méditations cosmographiques à la Renaissance* (Paris: Presses de l’Université Paris-Sorbonne, 2009), pp. 69–90.

Fine's paratexts also deserve note because he was a mathematician. The category of paratexts is especially expansive for mathematical books because it includes the diagrams interspersed throughout the book—early printers sometimes left spaces blank for later addition of diagrams, and only slowly did it become easier to incorporate woodcut or wire diagrams into the printing formes, so that diagrams could be moved from the margins into the page block itself. Far from being throwaway decorations, paratexts required careful planning. And they changed with time. Even as texts remained the same, paratexts were corrected for new times and needs. The power and significance of paratexts should not be underestimated; they established the value not only of the book, but of authors and their readers to their community. As Fine reminded patrons regularly, mathematical learning was vital for the kingdom.

By asserting his own hand in making these books, Fine certainly presented a kind of *authority* which I would argue amounts to a kind of *authorship*. It was in these paratexts that Fine constructed his republic of mathematics.

Amatores Matheseos in Paratexts

Fine's assertion of paratextual authority extended the project of a previous generation of mathematicians at Paris, which wrote the textbooks Fine first edited, including the *Textus de sphaera* just mentioned. This astronomy textbook was published in February of 1495 by Wolfgang Hopyl, business partner of Henri Estienne the Elder. The text at the book's core had been standard university fare since the early thirteenth century: Johannes de Sacrobosco's *Sphere*. But this large folio edition was stuffed with updated commentary, diagrams, and tables based on new editions of Ptolemy's

rediscovered *Cosmography*.²³ As so often, the sole trace of the book's makers is a colophon which identifies them as "lovers of mathematics":

Printed at Paris in the *Rue St-Jacques*, near the sign of Saint George, on the twelfth of February in the year 1494 [i.e. 1495] of Christ, creator of the stars, by the ingenious printer Wolfgang Hopyl. This thought is always firmly in his mind: great deeds are done not by power or speed or swift bodies, but by planning, judgment, and authority. [Done with the help of] the most diligent correctors Luc Walter Conitensis, Guillaume Gontier, Jean Grietan, Pierre Griselle, lovers of mathematics.²⁴

The author on the title page was Lefèvre himself, an arts master at the Collège du Cardinal Lemoine who published a complete renovation of the Paris arts curriculum in the decades around 1500, with a unique emphasis on mathematics. But consider in what sense Lefèvre was the author. Certainly, he was responsible for most of the text

²³ This work is set in context by Richard J. Oosterhoff, "A Book, a Pen, and the *Sphere*: Reading Sacrobosco in the Renaissance," *History of Universities*, 2015, 28(2): 1-54, pp. 5–8. A near-complete bibliography of early printed editions is given by Jürgen Hamel, *Studien zur "Sphaera" des Johannes de Sacrobosco* (Leipzig: Akademische Verlagsanstalt, 2014).

²⁴ Lefèvre, *Textus de sphaera* (Paris: Wolfgang Hopyl), colophon. "¶ Impressum Parisij in pago diui Jacobi ad insigne sancti Georgij Anno Christi siderum conditoris | 1494 duodecima februarij Per ingeniosum impressorem Wolfgangum hopyl. Cui hec sententia semper fir=| ma mente sedet: Non viribus aut velocitatibus aut celeritate corporum res magne geruntur: sed Consilio, Sen| tentia, et Auctoritate ¶ Recognitoribus diligentissimis: Luca Uualtero Conitiensi, Guillermo Gonterio, | Johanne Griettano, et Petro Grisele: Matheseos amatoribus."

in the volume—but he authored the *commentary*, not the main text. And Lefèvre’s students helped him at a couple of stages. In the prefatory letter, he thanked his “domestic” Grietan: “he is very studious in the skill of abacus and arithmetic, and knowledgeable in the rest of the mathematical arts. He wrote the work and, like Atlas, offered his shoulder to an exhausted man.”²⁵ Lefèvre also depended on his students to see the book through the press; we must see this work as the collective effort of a community. Their hands are visible here, in the colophon of this first edition alone, and very likely in the many other paratexts that make up the book. These paratexts—tables, diagrams, headings, indices, letters, with annotations and reference marks printed in the margins—would have made the book difficult to print, and it was for good reason that Hopyl relied on four correctors. Grietan, Lucca Walter, Guillaume Gontier, and Pierre Griselle, therefore, identify themselves as the community who produced this book.

In fact, Lefèvre often collaborated with students, even after he retired from arts teaching at the Collège du Cardinal Lemoine in 1508. Fine appears on the margins of this circle during his early editorial work of the 1520s, and later helped Lefèvre’s close collaborator Charles de Bovelles, editing and illustrating Bovelles’ effort at a vernacular geometry.²⁶ The prefatory letters, poems and other paratexts that knit together Lefèvre’s massive pedagogical *oeuvre* witness to the larger circle of

²⁵ Joannes Sacrobosco and Jacques Lefèvre d’Étaples, *Textus de Sphaera* (Paris: Wolfgang Hopyl, 1495), sig. a1v. Edited by Eugene F. Rice Jr., *The Prefatory Epistles of Jacques Lefèvre d’Étaples and Related Texts* (New York: Columbia University Press, 1972), ep. 8 p. 27.

²⁶ Charles de Bovelles, *Livre singulier et utile, touchant l’art et pratique de Geometrie, composé nouvellement en Francoys* (Paris: Simon Colines, 1542).

students involved in its authorship.²⁷ In such paratexts, students did two things. First, they framed Lefèvre as an authority. Several of Lefèvre's students published extensive commentaries on Lefèvre's textbooks. Josse Clichtove did this most extensively, on Lefèvre's introductions to Aristotle, but also through long explanations of Lefèvre's epitome of Boethian arithmetic and eventually also his handbook to planetary astronomy, the *Astronomicon*.²⁸ Second, in these paratexts, students declared themselves part of the community. Language of friendship and love therefore emerged in these letters and poems as a way to affirm relationships between students and teachers, and as a path to authorship.

Amicitia and Amatores

In the colophon given above, Lefèvre's colleagues identify themselves as *amatores matheseos*, "lovers of mathematics." This language of love placed them within the Renaissance economy of *amicitia*. Historians of the period have come to see how

²⁷ This is clear from the masterful collection of such textual bits edited by Rice

Prefatory Epistles (cit. note 25).

²⁸ Clichtove's commentary on the arithmetic is found in Jacques Lefèvre d'Étaples, Josse Clichtove, and Charles Bovelles, *Epitome compendiosaue introductio in libros arithmeticos divi Severini Boetii, adiecto familiari [Clichtovei] commentario dilucidata. Praxis numerandi certis quibusdam regulis (auctore Clichtoveo). Introductio in geometriam Caroli Bovilli. Astronomicon Stapulensis*. (Paris: Wolfgang Hopyl and Henri Étienne, 1503). The *Astronomicon* was republished with Clichtove's commentary as *Introductorium astronomicum theorias corporum coelestium duobus libris complectens, adiecto commentario declaratum* (Paris: Henri Estienne, 1517).

declarations of mutual affection bound together the nascent republic of letters, whose letter-writing manuals often drew explicitly on Cicero's example. The language of *amicitia* encompassed a broad spectrum of possible obligations—it insisted on the disinterested shared discourse of equals; it also facilitated relationships between patrons and clients. Friendship could be offered as a gift, at once freely given and a means for inscribing obligations and dependencies. All this is true, though it tends to create the impression that love and friendship were *merely* social currency. I would add that early modern intellectuals could see such social habits as rooted in the very subjects they studied.

Lefèvre and Fine depended no less than their Italian colleagues on the support of powerful patrons, from as the officer families of the Ganays and Briçonnets to the king himself.²⁹ Yet they rarely invoked the language of friendship in dedicatory letters to major patrons; instead, they reserved such language for students and fellow teachers. Consider one example. In Lefèvre's first book, the *Paraphrases on the Whole of Aristotle's Natural Philosophy* (1492), professions of love and friendship are not in the dedicatory letters, but tucked in the middle of the volume, prefacing a dialogue. Lefèvre writes to a friend who had corrected the proofs of his *Paraphrases*:

Dearest Stephanus, let outsiders marvel at how much goodwill there is among those who cultivate the liberal arts here in our University of Paris (where we know how it is). For sure, our men ridicule and curse as a three-headed Cerberus that scornful man "who has the nose of a rhinoceros" (as they rightly

²⁹ Eugene F. Rice Jr., "The Patrons of French Humanism, 1490-1520," in *Renaissance Studies in Honor of Hans Baron*, edited by Anthony Molho and John A. Tedeschi (Dekalb, IL: Northern Illinois University Press, 1971), pp. 687–702.

dub those who sneer³⁰). They think it better to cultivate the holy vow of friendship, as if they had been born of Minerva (once thought the goddess of wisdom and peace). And rightly so, as they say, for “philosophy” and “philosopher” are names that derive from love. After all, what is philosophy but the love of wisdom? And what is a philosopher but a lover of the same? So it rightly behoves them to be friends of one another (as they correctly suppose). From this it follows that when they see envious, malevolent men tearing at each other with their teeth, they will no longer hold them to be philosophers, but consider them transformed into Pythagorean dogs on account of their wicked condition. In order that we fall away from our duty, we bound ourselves together in mutual goodwill many years ago, so that your company (and that of our mutual friend Bohuslas Tinnensis) would always be most pleasing to me, and mine to you. You carefully brought my *Paraphrases* to light, corrected from those typesetters who often wander from the original unless a vigilant corrector is present. Moreover, you thought it good for me to add these introductory dialogues. I did this all the more willingly since you—so attentive a friend in this matter—you as a dearest friend wished, and demanded in a friendly way that they be made available for the crowd of our fellow philosophizers....³¹

³⁰ The phrase *habere nasum rhinocerotis* means “to sneer”; e.g. Martial expected Rome to sneer at his book: “maiores nusquam rhonchi; iuvenesque senesque | et pueri nasum rhinocerotis habent” (*Epigrammata* 1.3.5-6).

³¹ Jacques Lefèvre d’Étaples, *Totius Aristotelis philosophiae naturalis paraphrases* (Paris: Johann Higman, 1492), sig. J8r–v (ed. in Rice, *Prefatory Epistles*, [cit. note 25] pp. 15–16).

This letter projects a tone vastly more intimate than the measured respect Lefèvre offered patrons. But it is no less wrought, and it draws together many common features of epistles in the Republic of Letters. Love emerges from things shared: a style of learning; frustration with a certain “scornful man”; a history together; mutual friends; and, not least, the book in their hands is a shared product of their labors. This language, though common enough, should not be dismissed as *simply* trope. First, Lefèvre has little to gain from the letter. The location of the letter, buried in the book, and very fact that the modern editor, Eugene Rice, can only conjecture who Stephanus was, suggests that Stephanus is not a potential Maecenas. Lefèvre is not cultivating a contact, but recording a debt and giving credit where it is due. Second, this language of *amicitia* does not merely adopt the available idiom. *Amicitia* here resists more utilitarian ends, reflecting an ideal of philosophical friendship. Certainly Lefèvre emphasizes affection and goodwill between equals, *mutua benevolentia*, but he also presents such love as the root of true philosophy. He contrasted loving modes of philosophizing with the internecine mutilation of those who do not understand—typically, he castigates unloving behavior while refusing himself to name names and so to transgress the bounds of love. *Amor* is the very source of philosophy. The correct way to philosophize is to begin, as he and Stephanus had done, with friendship.³²

It is significant that Lefèvre brings up *amicitia* in a paraphrase of Aristotle, the most influential authority on the topic. Studies of early modern friendship often focus

³² A quick study of Rice, *Prefatory Letters* (cit. note 25), will reveal similar exchanges at Cardinal Lemoine: *inter alia*, see Clichtove to Charles de Bovelles (April 1500), pp. 79-80; Lefèvre to Bovelles (December 1501), pp. 94-96.

on the literary, Ciceronian ideals vaunted by Petrarch and repeated in textbooks.³³ But Cicero himself had formulated his account of friendship in *Pro Laelio* in dialogue with Aristotle, who devoted the entirety of books 8 and 9 of the *Nicomachean Ethics* to the virtue of friendship. Aristotle divided friendships into three kinds, those based on utility, pleasure, and goodness—the latter is *vera amicitia*, which one might enjoy with only a few people, for it required both reciprocity as well as long familiarity and close association. The climax of Aristotle’s account was in book 9, where he defined a true friend as another self.

Lefèvre’s medieval predecessors found Aristotle’s perfect friendship incomplete for the Christian because it left out *charitas*, the divine form of selfless love. In fact, the famous condemnations of Paris in 1277 prohibited the article “that charity is not a greater good than perfect friendship” (*Quod caritas non est maius bonum quam perfecta amicitia*). The Majorcan philosopher and missionary Ramon Lull reported on this condemnation, arguing that the Aristotelian theory is incomplete

³³ E.g. Elizabeth May McCahill, “Finding a Job as a Humanist: The Epistolary Collection of Lapo Da Castiglionchio the Younger,” *Renaissance Quarterly*, 2004, 57:1308–1345; Mark P. O. Morford, *Stoics and Neostoics: Rubens and the Circle of Lipsius* (Princeton, NJ: Princeton University Press, 1991). An exception is Ullrich Langer, *Perfect Friendship: Studies in Literature and Moral Philosophy from Boccaccio to Corneille* (Geneva: Droz, 1994). As McCahill points out, the letters to Atticus and Quintus, and then the letters *Ad familiares* were rediscovered in the fourteenth century (p. 1309). Cicero’s treatise on friendship, *Pro Laelio*, was widely read throughout the middle ages, and informed a monastic discourse on *amicitia*: Julian Haseldine, “Understanding the Language of *Amicitia*. The Friendship Circle of Peter of Celle (c. 1115–1183),” *Journal of Medieval History*, 1994, 20(3):237–260.

because it does not recognise that perfect human friendship depends on God's love.³⁴ Lull's account of divine love captivated Lefèvre. On reading Lull's *Contemplaciones* in 1490, Lefèvre experienced a quasi-monastic conversion to a life of intellectual service—he described himself as “seized by desire” for Lull's books.³⁵ In particular, Lefèvre was captivated by the vision of divine love Lull published in novelistic form as the *Blaquerna de amico et amato*, which he himself had printed in 1505.³⁶ Lull argued that only when warmed with love, when sown with the seeds of desire by God himself, can the intellect properly rise to know what is truly lovable, God. Knowledge depends on divine love.

Lefèvre began with divine love in his interpretation of Aristotle on friendship. Not only is *amicitia* the greatest of Aristotle's moral virtues, alongside justice. But Aristotle also, he suggests, agrees with Gospel virtue, where love for God and the

³⁴ *Declaratio Raymundi per modum dialogi edita contra aliquorum philosophorum et eorum sequacium opiniones erroneas et damnatas a venerabili patre domino episcopo parisiensi*, edited by Michela Pereira and Thedor Pindl-Büchel in *Raimundi Lulli Opera latina XVII* (Turnhout: Brepols, 1980 [CCCM 79]). On this exchange see Marco Toste, “*Utrum Felix Indigeat Amicis*: The Reception of the Aristotelian Theory of Friendship in the Arts Faculty at Paris,” in *Virtue Ethics in the Middle Ages: Commentaries on Aristotle's Nicomachean Ethics, 1200 -1500*, edited by István Pieter Bejczy (Leiden: Brill, 2008), pp. 173–174.

³⁵ Rice, *Prefatory Epistles* (cit. note 25), ep. 45, pp. 141-142.

³⁶ Ramon Lull, *Contenta. Primum volumen Contemplationum; Libellus Blaquerne de amico et amato*, ed. Jacques Lefèvre d'Étaples (Paris: Guy Marchant for Jean Petit, 1505). The same theme emerges in Lefèvre (ed.), *Proverbia Raemundi. Philosophia amoris eiusdem* (Paris: Badius, 1516).

neighbour is the greatest commandment and so enfolds all other precepts within it: “this makes *charitas* the highest point.”³⁷ *Charitas*, as the supreme task of the Christian, has to do with *divina amicitia*, friendship with God. To flesh out this form of divine love, “which makes us divine lovers,” Lefèvre added a list of “Twelve Properties or Conditions of a Lover” by Giovanni Pico della Mirandola.³⁸ These conditions frame love as radical sacrifice; one suffers shame for the beloved’s sake, desires the beloved before all else, and even weeps for joy or sorrow when present or absent from the beloved. In the remainder of his commentary, Lefèvre largely followed the contours of Aristotle, except to note that Jesus wept. (This falsified Aristotle’s view that tears are not manly). The aspects of *amicitia* that Erasmus would celebrate—such as the notion that a friend is another self—receive no special treatment in Lefèvre’s commentary on the *Nicomachean Ethics*.

Elsewhere, in his *Introductio artificiosa* to Aristotle’s moral philosophy, Lefèvre did shift Aristotle’s emphases. Like most medieval commentators, he agreed with Aristotle that all friendships are based on *benevolentia*, goodwill. Moreover, *vera amicitia* (the term the Fabrists preferred was *amicitia studiosa*) was not simply utilitarian or even based on shared pleasure. Rather, it grew out of appreciation of what is lovable in the other—the *bonum* or good. *Amicitia studiosa* involved a few,

³⁷ Jacques Lefèvre d’Étaples, *Decem librorum Moraliū Aristotelis, tres conversiones* (Paris: Simon Colines, 1535), fol. 78r. “Hec virtus ad deum et proximum, primum legis et maximum sibi obtinuit preceptum quo caetera clauderet. Haec charitatem sui habet apicem.” The allusion is to Matthew 22.39.

³⁸ Lefèvre d’Étaples, *Decem librorum Moraliū* (cit. note 37), fol. 78r-v. In 1505, when Lefèvre first published this commentary, this list was already available elsewhere in Europe, for example in England in Thomas More’s translation of 1504.

devoted equals, living together in harmony, giving freely without expecting recompense (but nobly responding to gifts with greater gifts!). This much fit a fairly straightforward reading of Aristotle. But Lefèvre's description of harmony (*concordia*) followed something rather closer to Pico, the Count of Concord. Aristotle had described harmony as a feature of civil society, ruled by justice, where the friendship naturally found in parents and children holds together the *polis*. In his *Introductio*, Lefèvre moved *concordia* away from Aristotle's account of civil society and into his account of the basic characteristics of friendship. Thus he reframed harmony as the shared interest of individuals: "harmony is when someone living with someone else chooses the same thing, rejoices at the same things, and even grieves at the same things."³⁹ Lefèvre thus brings together several characteristics of friendship: Christian sacrificial love (with its emphasis on sharing both joys and sufferings), the language of harmony, and the notion that "friends hold all things in common." The last phrase has been especially seen as a Pythagorean, Ciceronian, and finally Erasmian ideal of friendship.⁴⁰ But the proverb was more widely available in Aristotle.

³⁹ Jacques Lefèvre d'Étaples and Josse Clichtove, *Artificialis introductio per modum Epitomatis in decem libros Ethicorum Aristotelis adiectis elucidata commentariis* (Paris: Henri Estienne, 1507), fol. 39r. "Concordia vero, cum quis alicui convivens eadem eligit, iisdem gaudet, et iisdem quoque tristatur."

⁴⁰ After the first edition of *Adages* known as the *Collectanea*, Erasmus moved the longer proverb "Amicorum communia omnia" to the beginning of his *Adagiorum chiliades* (1508), "thereby establishing the proverb's status as programmatic for the collection as a whole." See Kathy Eden, *Friends Hold All Things in Common:*

Lefèvre often returned to the notion that knowledge begins with love, buttressed with the Pythagorean view of philosophy as love of wisdom. It formed a key plank in his critical program of university reform. If sophists of the day tore at each other with violent teeth, then he spoke to “those bound together with true philosophical love.”⁴¹ Commitment to harmony permeated Lefèvre’s view of the history of philosophy from an early stage: in 1493, newly returned from seeing Ficino and Pico in Florence, he echoed the Ficinian theme of the perennial philosophy beginning among the Egyptian priests and Chaldean magi. They left a “divine philosophy” of metaphysics which could be retrieved as the Ideas of the Platonists or the “eternal reasons” of the Aristotelians. “Their theology closely agrees and unites with the great harmony of Christian wisdom.”⁴²

The harmony of ancient philosophers could be glimpsed in certain texts which suggested that love was a basic force in the natural world. Aristotle reported fragments in which Presocratics such as Empedocles even described the elements of nature as moved by the opposing forces of Love and Strife.⁴³ In the hands of some Renaissance poets such forces took on enormous explanatory power. For Lefèvre, these were descriptions of physical realities. In the mid-1490s he wrote a long treatise

Tradition, Intellectual Property, and the Adages of Erasmus (New Haven: Yale University Press, 2001), p. 25.

⁴¹ Lefèvre d’Étaples, *Totius Aristotelis philosophiae naturalis paraphrases*, sig. b2r (edited in Rice, *Prefatory Epistles* [cit. note 25], 6).

⁴² Jacques Lefèvre d’Étaples, *Introductio in metaphysicorum libros Aristotelis*, ed. Josse Clichtove (Paris: J. Higman, 1494), sig. [a]1v (edited in Rice, *Prefatory Epistles* [cit. note 25], 21).

⁴³ *Metaphysics* A4, 985a31–3; Aristotle, *Phys.* II 8, 198b29.

De magia naturali, written as a dialogue between himself, Germain de Ganay, and Clichtove. The goal of natural magic was to accomplish “practical works” of the ancient “eastern Chaldeans,” using the hidden forces by which the sun, moon, and other heavenly bodies act on the earth. At the beginning of the first book Lefèvre stated the physical premise on which the rest of the book was based: “The hidden attractions of things are those which act through friendship; the hidden repulsions of things exist through hatred; I say that the hidden transmutations of things (done by natural magic, through the investigations of certain skilled men) are about mutual harmony of the heavens and earthly objects, where heaven acts and earthly things are passive.”⁴⁴ Fine, Jean Fernel, Antoine Mizauld, and others Paris intellectuals put the same themes to work in their own works on astrology, medicine, and alchemy.⁴⁵ Fine’s friend Fernel, first a mathematician and then a physician, observed that the ancient philosophers made “harmony the single principle of things.”⁴⁶

Lefèvre and others did not make much more of the idea that *amicitia* was a basic part of the cosmos’ hidden physics. Alain de Varenne made this explicit in a

⁴⁴ Olomouc, University Library, M I 1119, Lefèvre, *De magia naturali*, fol. 174v.

“Occulti enim sunt rerum attractus, qui per amicitiam fiunt, occulte rerum fuge, que sunt per odia; occulte inquam et rerum transmutationes quas natural[i]s magie beneficio, et solerti quidam indagine profitiunt, de mutuo celestium et terrenorum consensu, celo quidem agente, terrenis vero patientibus.”

⁴⁵ Didier Kahn, *Alchimie et Paracelsisme en France à la fin de la Renaissance (1567-1625)* (Genève: Droz, 2007).

⁴⁶ Jean Fernel, *De proportionibus libri duo* (Paris: Simon Colines, 1528), sig. a4r.

“Non itaque prorsus inscite antiquis philosophis literarum monumentis consecratum est, harmoniam unicum rerum principium esse.”

series of dialogues in the voices of his teachers, Lefèvre, Bovelles, and Clichtove. They spoke of the link between philosophy and theology, and progressed through a conversation on love, light, harmony, ending ultimately in the divine love of the Trinity.⁴⁷ But they repeatedly returned to love in terms that spilled over into mathematics: harmony, proportion, and means (i.e. *medium*). Lefèvre often presented mathematics as especially useful because it offered insight into the harmony and justice that Aristotle outlined in books 5 of the *Nicomachean Ethics*, around the arithmetical and geometrical means of distributive and rectificatory justice.⁴⁸ In one of the many passages where Lefèvre hints at how to transcend Aristotle’s mere “rational philosophy” to attain the “intellectual” philosophy of Dionysius the Areopagite and Nicholas of Cusa, he dwells on *analogia* and *medium* as the point of connection between them.⁴⁹ Each time, what fascinates Lefèvre is the harmonious links between disciplines. In fact, Lefèvre made this point in a preface to Bovelles’ first independent treatise (1501). There, in the tradition of Ramon Lull and Nicholas of Cusa, Bovelles presented the underlying structure of all knowledge as construed of opposites—which the mind joins by producing a medium.

⁴⁷ Alain de Varennes, *De amore dialogus, de luce dialogi, etc.* (Paris: Henri Estienne, 1512).

⁴⁸ E.g. Rice, *Prefatory Letters* (cit. note 25), p. 18, p. 380.

⁴⁹ Lefèvre, preface to Charles de Bovelles, *In artem oppositorum introductio* (Paris: Wolfgang Hopyl, 1501), sig. a1v–a2r (Rice, *Prefatory Epistles* [cit. note 26], pp. 94–96). Both terms are also mathematical, respectively “proportion” and “mean.” On the later *Ars oppositorum* (1511), see Joseph M. Victor, *Charles de Bovelles, 1479–1553: An Intellectual Biography* (Genève: Librairie Droz, 1978), pp. 64–65.

Friendship, love, and harmony—the latter in particular with reference to mathematics—formed a whole in Lefèvre’s circle. Was there something particular to link *amicitia* and mathematics? Mathematics was attractive to them precisely as a tool for finding concord between opposites—the basic insight of their philosophical heroes, Pseudo-Dionysius and Nicholas of Cusa. The fundamental reality of mathematics, on the Boethian-Pythagorean model Lefèvre taught in his various introductions to arithmetic and music, is proportion (*analogia*), literally the concords or harmonies between different realities. In contrast, logic or dialectic was the Aristotelian science of making distinctions, of separating realities—precisely the ills of philosophy that presented such heartache to Lefèvre and humanists in his wake. This was the discursive context in which Fine presented the king with mathematics as the tool needed to check “barbarous sophistry.”⁵⁰

Making a Republic of Mathematics

The cultural profile of mathematics grew dramatically in early sixteenth-century Paris, as throughout Europe. Astronomy and astrology grew in cultural importance through politics and medicine; but the textual basis for these disciplines remained the medieval quadrivium, even as new editions of Ptolemy and Euclid and printed textbooks such as those of Lefèvre’s circle expanded the quadrivium’s remit. Fine’s installation as the first *lecteur royal* in mathematics in 1531 has long been recognised

⁵⁰ On Fine’s campaign against *sophistes*, see Axworthy, “Le Statut des mathématiques” (cit. note 10), pp. 46ff. He informed the king that many were mere *pseudophilosophi* because, ignoring statute, students were not actually reading the first six books of Euclid. See Fine, *In sex priores libros geometricorum elementorum Euclidis* (Paris: Simon de Colines, 1536), ♀2v.

as both index and agent in these changes. Often these changes are seen as a matter of course, in the thought that cartographers like Fine were self-evidently useful to ambitious rulers of exploring nations.⁵¹ Yet this assumption explains neither the particular shape of mathematics, nor the strategies Fine and others used to establish their authority. In this section, I suggest that Fine self-consciously extended the language of friendship to draw readers into his notional “republic of mathematics,” so raising the status of his discipline.

The utility of mathematics was a trope gaining purchase. Early modern rulers increasingly funded mathematical practitioners, from the Casa de Contratación to John Dee and Galileo, expecting tools to build and defend their dominions. The expectation of utility also affected Fine’s mathematical community in Paris, which increasingly drew courtly interest. The physical places and material culture that united these communities is largely lost. Fine’s devoted student Antoine Mizauld recalled that princes and prelates often came to Fine’s house to marvel at the instruments and images he had made with his own hands.⁵² In the 1520s Jean Fernel, who also taught mathematics at the Collège de Sainte Barbe, seems to have ran a similar house, even

⁵¹ A good example is Lesley B. Cormack, “Mathematics and Empire: The Military Impulse and the Scientific Revolution,” in *The Heirs of Archimedes: Science and the Art of War through the Age of Enlightenment*, edited by Brett D. Steele and Tamera Dorland, Dibner Institute Studies in the History of Science and Technology (Cambridge, MA: MIT Press, 2005), pp. 181–203.

⁵² “Introduction” in *The Worlds of Oronce Fine*, edited by Marr (cit. note 10), pp. 8–9. Of Fine’s instruments, only a ship-dial (*navicula*) survives: Catherine Eagleton, *Monks, Manuscripts and Sundials: The Navicula in Medieval England*, (Leiden: Brill, 2010), pp. 130–131.

hiring instrument-makers to live with him, before he gave up mathematics after 1528 in order to pursue a more lucrative career in medicine.⁵³ These spaces hint at the larger community of instrument makers; but they also frame Fernel and Fine as points of contact between the worlds of work, university learning, and the politics of power.

Such go-betweens could be useful to rulers, it became clear in the 1520s. The king of Portugal, Manuel I, took a strong interest in the University of Paris, and in 1526 endowed fifty studentships at the Collège de Sainte Barbe, effectively purchasing the college.⁵⁴ It was prudent politics to have a Portuguese community in Paris. The college's principal, Jacques (Diogo) de Gouvea the Elder, had long acted as a Portuguese agent. In 1522 King John III of Portugal heard that Francis I planned to outfit an expedition to compete for New World holdings. Though Francis denied the plan, John III sent Gouvea to Normandy to find out the truth—where he soon found that Francis had indeed given word for Giovanni Verrazzano to outfit a ship.⁵⁵ Verrazzano's voyage of 1524 began France's long claims on North America—and

⁵³ John Henry points out that mathematics was not self-evidently useful to many early modern intellectuals: “‘Mathematics Made No Contribution to the Public Weal’: Why Jean Fernel (1497–1558) Became a Physician,” *Centaurus*, 2011, 53(3):193–220.

Henry's account contrasts mathematics and medicine; the same episode could, I think, illustrate continuities between them.

⁵⁴ Jules Étienne Joseph Quicherat, *Histoire de Sainte-Barbe* (Paris: L. Hachette, 1860), pp. 125–127.

⁵⁵ Michael Wintroub, *A Savage Mirror: Power, Identity, and Knowledge in Early Modern France* (Stanford: Stanford University Press, 2006), p. 27; Ina Baghdiantz McCabe, *Orientalism in Early Modern France Eurasian Trade, Exoticism, and the Ancien Régime* (New York: Berg, 2008), pp. 69–71.

confirmed the need for European rulers to invest in tools of navigation. This background should be kept in mind when reading Jean Fernel's dedication of his new *Monalosphaerium* to Gouvea, where Fernel recalls that Gouvea had asked for the college to give special thought to mathematics during his last trip to Portugal. Fernel emphasised that Gouvea was motivated to be of use to the Portuguese king.⁵⁶ The link became even clearer in Fernel's *Cosmotheoria* (1528), dedicated directly to John III with thanks for the rich endowment. Fernel refers to the wonders of Arabia, Ethiopia, and India, all borne by Portuguese ships. He does not quite say but strongly hints that his new device for seeing the various parts of astronomy will help the king of a new, growing empire to see "at a glance" the entirety of his worldwide domains.⁵⁷ Though he refers to the "overflowing love of letters" as a reason for John's support of "every sort of learning," in the context of international intrigue it is impossible to ignore the subtext: Fernel hopes to trade on the utility of mathematics for empire.⁵⁸

It was in this context of power patronage that Francis appointed Fine as a royal professor. Becoming the *lecteur royal* in mathematics placed Fine in a difficult position. He had prestige, but not necessarily security; the king often payed in his own

⁵⁶ Jean Fernel, *Monalosphaerium, partibus constans quatuor* (Paris: Simon Colines, 1527), sig. a6r–v.

⁵⁷ Jean Fernel, *Cosmotheoria, libros duos complexa* (Paris: Simon Colines, 1528), fol. 5v–6v.

⁵⁸ Fernel, *Cosmotheoria* (cit. note 57), fol. 5v, "Tu vero REX amplissime, sic orthodoxa fide efferbuisti, sic demum te totum perfudit literarum amor, ut praeter eos syncerioris theologiae cultores quos hactenus fovisti, quinquaginta collegiales magnificis sumptibus nuper institueris, apud hanc nostram celebratissimam Parisiorum academiam omni disciplinarum genere erudiendos."

time.⁵⁹ Yet with the king as his primary patron it was a delicate matter to seek patronage elsewhere. In 1532 he dedicated the *Protomathesis* directly to the king. This was his *magnus opus*, comprising four books of arithmetic, geometry, cosmography, and dialling. But in the following years, Fine carved the *Protomathesis* into separate publications. He, at least, thought they should still matter to royal patrons. He dedicated the French translations of his *Cosmographie* to Francis' successor, Henri II, in a beautiful manuscript copy. Then he dedicated an updated copy of the Latin *Cosmographia* to young Edward VI of England (1551).⁶⁰ These were not merely reprints to supply an expanding market. Closely supervising each edition, Fine expanded and developed the paratexts that framed these books—reminding the king of his needs, seeking new patrons, and above all finding new consumers for his disciplines.

Does the *Protomathesis* simply reflect the utilitarian needs of a would-be empire? In these paratexts, although practical utility by no means the main argument for mathematics, it does often feature in Fine's own apologies for his discipline. Fine's reputation was based on practical application. Quite apart from his exquisite maps, the great majority of Fine's own works are aimed at measuring, calculating,

⁵⁹ On Fine's pecuniary troubles, see Ross, "Mathematical Works of Fine" (cit. note. 11), 26-30. Many other kinds of practitioners dependent on the king, from painters to builders suffered the same uncertainty. Mario Biagioli explores these tensions in "Etiquette, Interdependence, and Sociability in Seventeenth-Century Science," *Critical Inquiry*, 1996, 22(2):193–238, at pp. 212-216.

⁶⁰ This last dedication was probably not successful in eliciting support; in 1555 he tried again, this time dedicating it to the wealthy Antoine Olivarius, bishop of Lombez.

drawing, and even instructing others on making their own sundials and other instruments. His short work on music emphasizes the use of different scales more than harmonic theory; he regularly published canons for interpreting ephemerides, chiefly used by astrologers. The *Protomathesis* itself describes its arithmetic as “practical,” its cosmography as a preparation for mapping land and sea, and includes a fourth treatise on sundials and quadrants. In short, Fine was a practitioner.

But Fine presented his larger, more ornate works as a “theoretical practical mathematics,” as Adam Mosley has suggested for the *Cosmographia*.⁶¹ That is, Fine has a rather elevated view of “practical.” Certainly he presents his mathematical works and instruments for “utility” and “use”—especially to the commonweal more generally. But if there is a continuum from intellectual theory to manual practice, Fine’s “practical” works are chiefly occupied with joining the extremes, and emphasize the wide continuum between. This was no accident, but a result of Fine’s

⁶¹ Adam Mosley, “Early Modern Cosmography: Fine’s *Sphaera Mundi* in Content and Context,” in *The Worlds of Oronce Fine*, edited by Marr (cit. note 10), p. 128ff. This perspective should be added to our repertory of views on the place of practitioners between theory and practice; very different approaches include Pamela H. Smith, *The Body of the Artisan: Art and Experience in the Scientific Revolution* (Chicago: University of Chicago Press, 2004); Lissa Roberts, Simon Schaffer, and Peter Dear, eds., *The Mindful Hand: Inquiry and Invention from the Late Renaissance to Early Industrialization* (Chicago: University of Chicago Press, 2007); Stephen Pumfrey, “The History of Science and Renaissance Science of History,” in *Science, Culture and Popular Belief in Renaissance Europe*, ed. Stephen Pumfrey, Paolo L. Rossi, and Maurice Slawinski (Manchester: Manchester University Press, 1991), pp. 48–70.

careful attention to his audience. In the third edition of his *Arithmetica practica* (1542), he changed only one note, the last *conclusio authoris* directed to the *amice ac studiose lector*. There he inserted a long notice which reads as a defense against critical readers of earlier editions: “no one should marvel or easily burden” him because he had not put every kind of arithmetical problem in his book. “For I judged that was not only useless, but also unworthy of a mathematical man.” Instead, he had included only the “purer and universal practice of arithmetic,” which should serve as the basis for all other more applied forms of counting, from astronomy to the business of merchants.⁶² The value of “practical” arithmetic was not simply in business, but also—as the next abbreviated edition of the book proclaimed on the title page, “greatly useful and necessary for those who aspire not merely to mathematics, but to philosophy.”⁶³ He abbreviated this particular edition to avoid “the impossible-to-unfold labyrinths of common business.”⁶⁴

[insert Figure 3 here]

⁶² Oronce Fine, *Arithmetica practica*, 3rd edition (Paris: Simon de Colines, 1542), fol. 67r. “Ne miretur quispiam, aut nobis leviter imponat, si hanc nostram Arithmeticae praxin, innumera regularum seu vulgarium quaestionum multitudine, honorare distulerimus; utpote, quoniam id non inutile tantum, sed viro etiam mathematico censuimus indignum ... Hac igitur de causa, puriorem ac universalem Arithmeticae praxin his quatuor libris perstringendam fore duximus.”

⁶³ Oronce Fine, *Arithmetica practica ... Iis qui ad liberam quamvis, nedum Mathematicam, adspirant philosophiam perutilis, admodumque necessaria*, 4th edition abbreviated (Paris: Simon de Colines, 1544).

⁶⁴ Fine, *Arithmetica practica* (cit. note 62), fol. 2v. “ommissis regularum, vulgarumque negotiorum inexplicabilibus labyrinthis.”

Figure 3. Oronce Fine, *Arithmetica practica...*, 3rd ed. (Paris: Simon de Colines, 1542), Cambridge University Library Eee.122, fols. 67r-v, where the new “author’s conclusion” to the friendly reader thickens the layers of paratexts ending the work.

The notes framing this theoretical practical mathematics, drawing the “friendly reader” to the “common utility of all the studious,” served both epistemic and social functions. Epistemically, they framed mathematics as an elevated aid to philosophical activity in a manner reminiscent of the Fabrists. Fine urged Paris intellectuals to take seriously the Platonic and Aristotelian commonplaces that mathematics was an intermediate discipline, the very connective tissue between the study of natural particulars and the abstract truths of divinity.⁶⁵ Socially, Fine deployed the language of *amicitia* to project and manage his mathematical community in a way that also echoes Lefèvre’s circle. Let me focus on three ways love emerges in these paratexts.

First, Fine used terms of *amicitia* to delineate insiders and outsiders. While he often mentions the dedicatee’s love of the liberal arts, Fine reserves more consistent discussions of friendship for the community of practitioners itself rather than for his patron. To king Francis at the beginning of the *Protomathesis* Fine expressed that he “hoped to present something that could better explain the mathematical matter itself

⁶⁵ Angela Axworthy has finely excavated the epistemic assumptions of Fine’s prefaces in “The Epistemological Foundations of the Propaedeutic Status of Mathematics according to the Epistolary and Prefatory Writings of Oronce Fine,” in *The Worlds of Oronce Fine*, edited by Marr (cit. note 10), pp. 31–51; see also her “Le Statut des mathématiques” (cit. note 10).

and, at least in part, to arrange it for future lovers of the good arts.”⁶⁶ The book is for students, *amatores*-in-training. Some students were his own, and he later defended his choice to reprint parts of the *Protomathesis* by citing his students’ difficulty in finding copies.⁶⁷ But he also labeled his broader readership as *amatores*; the *Cosmographia* (1555 edition) was written “partly for my auditors, but partly for other lovers of heavenly matters.”⁶⁸

In the proliferating paratexts of successive editions, the community expanded. Poems presented the community with exemplars and norms: Fine’s students and colleagues such as Jean Fosser and Antoine Mizauld exemplified the modes of loving

⁶⁶ Oronce Fine, *Protomathesis* (Paris: G. Morhii, 1532), AA2v. “Desiderabam igitur, aliquid melioris elucidationis rei mathematicae posse praestare: et futuros bonarum artium amatores, hac saltem in parte dirigere.”

⁶⁷ Oronce Fine, *De mundi sphaera, sive cosmographia* (Paris: Simon de Colines, 1542). See also Agostino Ricci, *De motu octauæ sphaeræ, opus mathematica, atq[ue] philosophia plenum*, edited by Oronce Fine (Paris: Simon de Colines, 1521), fol. 1v-2r. In the prefatory letter, Fine explains that students asked him for the book, “especially Nicolas de Prato, a much beloved friend to me and worthy of my thanks beyond the rest” to print the book “for them, and for all lovers of mathematics” (Quem quidem libellum cum nostris ostentassem auditoribus.... orarunt statim (praecipue Nicolaus a Pratis, nostri amantissimus, et praeter reliquos de nobis bene meritus) ut eundem libellum ipsis, et omnibus Mathematicarum cultoribus, officio artis impressoriae communicarem.”

⁶⁸ Oronce Fine, *De mundi sphaera, sive Cosmographia* (Paris: Michel de Vascovan, 1555), sig. *2v. “partim ut auditoribus nostris, partim vero caeteris rerum caelestium amatoribus ... faceremus.”

praise that should characterise this community.⁶⁹ In many ways, they did the same as Lefèvre’s students had done. They cemented their teacher at the center of the community, and in turn used his reputation to bring others into print—in the years after Fine’s death in 1556, his son and Mizauld together printed several of Fine’s manuscript works, with extravagant praise. But such poems also identified readers who were plainly not part of the community of practitioners. In a manual on finding longitude, Fine hoped it would be acceptable to the king because he had “solely devoted my affection to so noble and perfect science as these aforementioned mathematics, of which you have always shown yourself a true and royal amateur.”⁷⁰ Thus poems invited the broader community of readers actively to participate—even to collaborate in the book’s authorship by correcting it. (Similarly, notes in the text itself even addressed the *studioso lectori*, urging him to complete certain tasks, such as demonstrations.) At the end of the *Protomathesis*, Fine asked indulgence for his Latin; in the king’s presentation copy of his French *Cosmographie* (1549), supplied a

⁶⁹ E.g. the poem praises Fine as another Daedalus, Endymion, Praxiteles, etc., ending with: “Unde mihi Rhetor, subitusque Poeta videris, | Philosophus, pictor, Geometresque simul |...” Oronce Fine, *Arithmetica practica, libris quatuor, absoluta* (Simon de Colines, 1535), fol. 65v.

⁷⁰ *L’art et maniere de trouver certainement la longitude ...*, 1543, Paris, Bibliothèque Nationale, ms. français 1337, préface et textes liminaires, fol. 1r-v. “[j]’ay] mis singulierement mon affection / a si nobles et perfaictes sciences comme sont lesdictes mathematiques : desquelles vous este tousjour demonstré vray et royal amateur.” (Edited by Axworthy, “Le Statut des mathématiques” (cit. note 10), Appendix II, pp. 487-490.)

verse begging the “Amy lecteur,” if he should find any error, “admende lá, et selon ton degré | Perforce toy (si tu peux) de mieulx faire.”⁷¹

[insert Figure 4 here]

Figure 4. Fine, *Le sphere du monde*, autograph presentation copy for Francis I, Harvard, Houghton Library Ms Typ 57, fol. 3v, with Fine’s new poem to the “benevolent reader.”

Besides various poems, the chief additions to later editions of the treatises that made up the *Protomathesis* are the “author’s conclusion,” addressed to the “friend and studious” reader.⁷² Such additions are numerous. Even his manuals for interpreting ephemerides—a grubby, workaday collection in a working practitioner’s library—include the final claim that Fine had invested his labours “for all those who are *amateurs* of the science [i.e. of astronomy].”⁷³

Second, Fine presented mathematics as a resource to defend against fractious philosophizers; he aligned its epistemic virtues with peace, not war. In Lefèvre’s books, true philosophy began with love; in the same vein, Fine’s paratexts police the borders of his community by identifying unfriendly behaviour of philosophy’s enemies, *sophistes* and *barbares*.⁷⁴ Since Fine had such control over the production of

⁷¹ Houghton Library, Harvard, MS Typ 57. Paratext later published in Oronce Fine, *Le sphere du monde proprement ditte cosmographie composee nouvellement en francois* (Paris: Michael de Vascosan, 1551), fol. a4v.

⁷² E.g. Fine, *Arithmetica practica* (cit. note 69), 65r.

⁷³ *Canons d’almanachz qil’on nomme Éphémérides* (Paris: Simon de Colines), fol. 33v. “...a tous ceulx qui sont amateurs de la science.”

⁷⁴ Prefatory letter to *Protomathesis* (cit. note 66).

his books, he also used them to fend off unfriendly attacks. In the third edition of his *Arithmetica practica*, Fine added a short note to defend his particular approach, and why he had not added more practical examples. Moreover, he drew in friends to defend him: Nicolas de Bourbon wrote a verse *In Orontii obtrectatores*, defending him from the “teeth” of the “barbarians” who seek to obscure “our Oronce.”⁷⁵

In contrast to sophistic quarrels, the Fabrists presented mathematics as the science of harmony. This theme occasionally emerges in Fine’s works, though much less often. (Significantly, he wrote only a very minor work on music.) One rare example is in Fine’s first publications. On completing one of his first editorial tasks,⁷⁶ Fine explained his relationship to his patron through a mathematical analogy—literally, an “*analogia*” or proportion between two extremes (Fine and the patron), united by the “medium” of the book.⁷⁷ Occasionally, he pointed out the conciliatory value of mathematics.

⁷⁵ Fine, *Arithmetica practica* (cit. note 62), fol. 67v.

⁷⁶ These were the massive folio volumes of the sentence commentaries of the fourteenth-century Scotist theologian, Johannes de Bassolis, *In quartum sententiarum*, edited by Oronce Fine, 4 vols. (Paris: François Regnault and Jean Frellon, 1516-1517). In each volume, Fine included his name on the title page, luxurious dedicatory letters, and laudatory letters from friends who named Fine “astronomicus.”

⁷⁷ Bassolis, *In quartum sententiarum* (cit. note 72), iv, fol. 2r. “Quod factu haud facile existimavi, nisi medio quodam analogico extrema unirentur. Ut si viginti ad quirinium componantur, cum longe distent, medio indigere constat, denario quidem; ad quem viginti eandem quam ipsi ad quinque obtineant habitudinem. Sed quia quinarum dupli denarium constituunt, ipsorum igitur viginti ad decem, et decem ad quinque (ex iam dicta analogia) eadem consurgit proportio quadrupla, qua et viginti et quinque

Instead, more often than the Fabrists, Fine praised the certitude of mathematics as a solution to dissension. In particular, Fine seems to have held out certitude to Francis I as a social value mathematics might offer. In an extended poetic oration, probably given on his appointment as *lecteur royal*, he framed his work as a humanist reaction to learned infighting. He piled up commonplaces about mathematical studies as the mean between high theology and low natural philosophy, rightfully so because it they are “perfect, authentic, and the mirror of all certitude” (*sont parfaites, authentiques, | Et le miroir de toute certitude*).⁷⁸ Fine then observed that Plato and even Cicero recommended such studies to “lovers of the common good” (*amateurs du bien commun*). The contrast between certitude and dissension was a recurrent theme. In the *Protomathesis*, Fine listed certitude as its first virtue, before blaming the sorry state of mathematics on the “plague” of dithering sophists leading the youth astray.

Third, Fine also stressed the status of mathematics as a liberal art, and therefore worthy of scholarly love and desire. Perhaps no theme is so central to Fine’s letters as the love of “good letters” (*bonae litterae*), ever accompanied by the reminder that mathematics belonged among them. While letters to students and colleagues tend to specifically recognize them as lovers of mathematics, letters to patrons often stress their love for the liberal or noble (*ingenuae*) arts in general. This

revinciuntur. Cum igitur hoc ita demonstretur, et mea exilitas tuae caelsae amplitudini nulla ex parte adhereat, iudicavi medium esse adhibendum, quo tuae reverendae paternitati satisfacere aliqua ex parte valerem, quod que tuae dignissimae maiestati, et rarissimae eruditioni sane congrueret.”

⁷⁸ *Epistre exhortative* (1532), reprinted in Oronce Fine, *Le sphere du monde, proprement ditte cosmographie* (Paris: Michel de Vascovan, 1552), 60v.

rhetorical move reminds patrons that if they really consider themselves supporters of polite letters, their generosity should extend beyond the verbal arts.

But Fine does not merely rely on the antiquity of the hoary marriage between the quadrivium and the trivium. He also draws attention to those features of the numerate disciplines which make them suitable for polite society. The strategy is especially clear in an early letter *elevated view* to Louis Dysque, a courtier, in his purplest prose: “Farewell, my rarest ornament of nobility, and love forever your Oronce (as you will do in turn)...”⁷⁹ Fine uses the language of mutuality so important to the culture of *amicitia*, playing with the possibilities of Latin grammar to fold himself together with his addressee. The letter extends this language of desire to mathematics itself, as Fine describes his own instant attraction to mathematics, and assures Louis that he would feel the same:

For if you have tasted mathematical disciplines once, you will confess that you have never known anything easier (as they have an immediately sensible object), more pleasurable (since they easily draw one out of the gloom of ignorance into the radiance of truth), more noble (on account of their clarity, stability, and even participation in divinity), and finally more useful (since they offer help not to be spurned to the mastery of all other arts, whether mechanical or liberal).⁸⁰

⁷⁹ Juan Martínez Silíceo, *Arithmetica in theoricen, et praxim scissa*, edited by Oronce Fine (Paris: Henri Estienne, 1519), sig. A2r. “Bene vale nobilium decus, et meum rarissimum, et tuum Orontium (quod mutuo facies) semper ama, tuo itidem dignissimo, tuisque (utinam mei) amantissimo germano, Domino Francisco Dysque, curiae supremæ viro senatorio, me charum reddas.”

⁸⁰ Fine, letter in Silíceo, *Arithmetica* (cit. note 79), sig. A1v-A2r. “Si namque mathematicas semel gustaveris disciplinas, te nihil usquam facilius (ut pote quæ sensibile habent obiectum) nihil iucundius (cum ex ignorantiae tenebris, ad veritatis

The rhetorical force of the argument is in Fine's effort to draw Louis and his readers into the experience. Such a discipline is worthy of desire. Fine asks forgiveness if he is "exhorting Minerva, for I greatly desire that you—born with a dextrous wit, overflowing with outward goods, a flower of the age, Latinate and more—that you also polish and perfect the culture of mathematics."⁸¹

The desire is, of course, proper. Improper desire for knowledge had a long pedigree as *curiositas*. Fine's manuscripts reveal him too interested in alchemy, astrology, and the kinds of learning that earned censure for curiosity, not to carefully preempt such accusations by invoking *studiositas*. As will be clear by now, Fine's addresses to his reader are suffused with terms of friendship (*amice, benevole*) alongside *studiose*. I would suggest, in light of Lefèvre's preference for the term *amicitia studiosa* to the *vera amicitia* of Aristotle, that Fine purposely links intellectual friendship to proper intellectual desire.

* * *

Fine's republic of mathematics wasn't entirely confined to his imagination. Neither was it so populous. In 1547 Jacques Peletier du Mans, a member of the dynamic poets

radium quemque faciliter evocent) nihil item nobilius (ob earum candorem, stabilitatem, cumque divinitate participationem) nihil tandem utilius (cum ad reliquas omnes, cum mechanicas, tum liberales capescendas artes, non aspernandas videantur ferre suppetias) cognovisse fateberis."

⁸¹ Fine, letter in Siliceo, *Arithmetica* (cit. note 79), sig. A2r. "Parc si, velut fus, minervam exhoror, percipio enim te, qui dexteriore natus es ingenio, quam bonis externis abundas, aetate flores, latinus, et pluriscius es, Mathematicarum etiam cultura poliri, atque perfici."

that made up the Pléiade and a talented mathematician in his own right, wrote a poem in which he defied “ceux qui blâment les mathématiques,” saying that the more others attacked mathematics the more they “inflame me to love it.” The rarer, the more desirable. Peletier marks the end of Fine’s tradition of love language for mathematics. He brought up the theme with particular clarity in his edition of Euclid in 1557. Geometry will be the source of social unity, precisely because its certainty leaves no space for wrongheaded dispute; geometry does not merely persuade, but forces consent.⁸² In fact, geometry explicitly offered a model for friendship. “Geometric positions, which offer useful aids to one another, declare that everything in the nature of things consists and depends on mutual supports of one to another. Indeed the laws of friendship itself are plain to see in the similitudes of shapes, which are all bound together by a diameter.”⁸³

Yet even as the mathematical community grew, the theme of *amateurs* diminished in its books. A couple of decades after Fine’s death in 1556, the mathematical community in Paris had expanded somewhat, at least in print. The long dispute between Jacques Charpentier and Peter Ramus was over Fine’s chair in mathematics, which Ramus believed Charpentier had cheated him of. After Charpentier died, Ramus’ students Jean Pena, Jean Forcadel, and Henri de

⁸² Jacques Peletier, *In Euclidis Elementa Geometrica demonstrationum libri sex* (Lyon: Jean de Tournes and Guillaume Gazeau, 1557), sig. A4r. “Eius quippe rationes non persuadent, sed cogunt.”

⁸³ Peletier, *In Euclidis Elementa* (cit. note 82), sig. A4r. “Geometricae positiones, quae operas auxiliarias inter se praestant, omnia in rerum natura mutuis alternisque subsidiis niti et consistere declarant. Quinetiam amicitiae ipsius iura, in Figurarum similitudine, quarum colligationem Diameter efficit, conspicua sunt.”

Monantheuil all held the chair. This generation was especially productive, with the help of two printers deeply committed to mathematical publishing, Michel de Vascovan and Guillaume Cavellat.⁸⁴ In the later part of the century, important treatises were published by growing generations of Parisian mathematical practitioners such as Jean Bullant and Philibert De l'Orme. Yet these works, whether Latin or French, largely eschew the language of love that Fine had used to establish the discipline. Even one of the more selfconsciously literary examples of the experimental arithmetics published in French, a work which Peletier published with extensive letters to his dear friend Theodore Beza, includes little of this use of *amicitia*.⁸⁵ As Natalie Zemon Davis observed, none of these authors waste an opportunity to raise the status of their discipline by assimilating it to the liberal arts,⁸⁶ yet the language of love drops away.

Conclusion

Oronce Fine clearly fits the role of mathematical practitioner, a category historians have used to describe mapmakers, architects, instrument-makers, astronomers and astrologers, abacus teachers, and *Rechenmeistern*, and very often some mixture of these—figures who made a career out of putting the mathematical arts into practice.

⁸⁴ Isabelle Pantin, “Les problèmes spécifiques de l’édition des livres scientifiques à la Renaissance: l’exemple de Guillaume Cavellat,” in *Le Livre dans l’Europe de la Renaissance*, Colloque, Tours, 1985 (Paris: Promodis, 1988), pp. 240–52.

⁸⁵ Jacques Peletier, *L’arithmétique du Jacques Peletier du Mans, departie en quatre livres à Theodore Debesze* (Paris: Marnef, 1549).

⁸⁶ Natalie Zemon Davis, “Sixteenth-Century French Arithmetics on the Business Life,” *Journal of the History of Ideas*, 1960, 21(1):18–48.

Yet those who made their livelihoods out of mathematics relied on larger communities of consumers who were committed to mathematics, perhaps with some skill, yet not dependent on practicing the discipline—members of Fine’s mathematical republic. Fine, I have argued, used the rich language of love and friendship to identify such supporters as *amatores* of the arts in general, and sometimes specifically of the mathematical arts.

But Fine’s life shows a special porosity of the spaces between university, court, print shop, and workshop. This in-betweenness makes it difficult to tell his story around any one of those locales. Royal professors drew salaries from the king and traded on courtly prestige, but since they had no building, they still carried out these roles within other colleges. Besides his usual teaching at Navarre, it seems likely Fine taught from his home, perhaps even in his workshop there. It is precisely this porosity which marks Fine’s case off from mathematical practitioners elsewhere. In Portugal and Spain, such practitioners seem to have coalesced around the figure of the cosmographer.⁸⁷ In Italy, at least at the beginning of this period, mathematical practitioners seem mostly divided between the *abbacisti* such as Tartaglia or the university-trained astrologer-physicians such as Cardano.⁸⁸ In Germany, Wittenberg-

⁸⁷ Víctor Navarro-Brotóns, “The Teaching of the Mathematical Disciplines in Sixteenth-Century Spain,” *Science & Education*, 2006, 15(2-4):209–233; María Portuondo, *Secret Science: Spanish Cosmography and the New World* (Chicago: University of Chicago Press, 2009).

⁸⁸ Mario Biagioli, “The Social Status of Italian Mathematicians,” *History of Science* 27, no. 1 (1989): 41–95; Monica Azzolini, *The Duke and the Stars: Astrology and Politics in Renaissance Milan* (Boston: Harvard University Press, 2013). More generally, Biagioli suggested comparative perspective on authorship and credit in the

trained teachers of mathematics established a stable if low-status presence in universities, a role quite distant from courts.⁸⁹ In England, Stephen Johnston has suggested that the mathematical practitioner chiefly worked in utilitarian contexts, away from both university and court.⁹⁰ This is not to say that, outside of Fine's France, mathematics never featured the language of friendship.⁹¹ Alexander Marr has

context of relationships between patrons and expert-practitioners: Mario Biagioli, "Scientific Revolution, Social Bricolage, and Etiquette," in *The Scientific Revolution in National Context*, ed. Roy Porter and Mikulás Teich (Cambridge, 1992), 11–54; idem, "Le prince et les savants. La civilité scientifique au 17e siècle," *Annales. Histoire science sociales* 1995, 6:1417–53.; idem, "Etiquette, Interdependence, and Sociability in Seventeenth-Century Science," *Critical Inquiry*, 1996, 22(2): 193–238.

⁸⁹ Robert S. Westman, "The Melanchthon Circle, Rheticus, and the Wittenberg Interpretation of the Copernican Theory," *Isis*, 1975, 66(2):164–193; Franz Graf-Stuhlhofer, *Humanismus zwischen Hof und Universität: Georg Tanstetter (Collimitius) und sein wissenschaftliches Umfeld im Wien des frühen 16. Jahrhunderts* (Vienna: WUV-Universitäts Verlag, 1996).

⁹⁰ Stephen Johnston, "The Identity of the Mathematical Practitioner in 16th-Century England," in *Der "mathematicus": Zur Entwicklung Und Bedeutung Einer Neuen Berufsgruppe in Der Zeit Gerhard Mercators*, edited by Irmgarde Hantsche (Bochum: Brockmeyer, 1996), pp. 93–120. Consider also the urban context of mathematical practitioners explored Deborah E. Harkness, *The Jewel House: Elizabethan London and the Scientific Revolution* (New Haven: Yale University Press, 2007).

⁹¹ In fact, this forms the main theme of the dedicatory letter to Daniele Barbaro in Proclus, *In primum Euclidis Elementorum librum commentariorum ... libri IIII*, trans. Francesco Barozzi (Padua, 1560).

showed that for the Urbinate architect Mutio Oddi, optics could serve as a particular idiom for his friendship with the merchant Peter Linder.⁹² And the popularising Walther Ryff of Nuremberg, who styled himself “mathematischer Künstliebhaber” (lover of the mathematical arts) in his technical books. But Ryff’s language may be a short-term echo of Fine, whom Ryff stitched together with extracts from other mathematical authors.⁹³ But to my knowledge the language of love does not consistently frame mathematics in these contexts. I have not even found it in the large works of architecture and prestige mathematics that emerge in Paris in the second half of the sixteenth century. Fine’s case seems peculiar.

It is as an outstanding example of such in-betweenness, that Fine returned constantly to his disciplines’ value for the *amatores artium*. This peculiarity is best explained by Fine’s place at the crossroads of several moments of transition—all evident in the earlier generation of scholars around Lefèvre d’Étaples. First, printers, though working with established technology, were still very much experimenting with typographic and editorial conventions in the decades after 1500.⁹⁴ Furthermore,

⁹² Alexander Marr, *Between Raphael and Galileo: Mutio Oddi and the Mathematical Culture of Late Renaissance Italy* (Chicago: University of Chicago Press, 2011), chapter 3.

⁹³ I owe this reference to Alexander Marr, “Walther Ryff, Plagiarism and Imitation in Sixteenth-Century Germany,” *Print Quarterly* 31, 2014:131–143, at p. 140; see also Julian Jachmann, *Die Architekturbücher des Walter Hermann Ryff: Vitruvrezeption im Kontext mathematischer Wissenschaften* (Stuttgart: Ibidem-Verlag, 2006), p. 52.

⁹⁴ Consider the emergence of the title page and paragraph indentation at this time: Margaret M. Smith, *The Title-Page: Its Early Development 1460-1510* (London: Oak Knoll Press, 2000); Frans A. Janssen, “The Rise of the Typographical Paragraph,” in

artisanal practitioners were just beginning to use print to advertise and expand their business.⁹⁵ Second, the humanist allegations of barbarous philosophising had not yet been incorporated into the very fabric of university education as would later happen, so that for Lefèvre, Budé, and Fine, the *amicitia* of the republic of letters still meant something local and concrete. In this paper I have focused on these two transitional moments, and only gestured towards a third: in the early sixteenth century the boundaries of the mathematical disciplines were in flux, as practitioners renegotiated links between the prestigious quadrivium and the servile arts of practical measurement.

For the longer history of the *amateur*, Fine's case provides a point of contrast precisely because its beginning and an ending can be traced. I have tried to show how, exploiting several layers of authorship, Fine inserted mathematics into the language of the republic of letters and so cloaked his *metier* in authority. From a position of weakness, therefore, Fine's language of *amatores* leveled social distinctions, ultimately to bid for more consumers. This did not last. I have suggested an early end point, but certainly by the eighteenth century the term no longer defined devotees of mathematical pursuits. Indeed, among the *modernes* the various sciences pendent on number had come to exemplify the ultimate contrast with the new aesthetic domains

Cognition and the Book: Typologies of Formal Organization of Knowledge in the Printed Book of the Early Modern Period, ed. Karl A.E. Enenkel and Wolfgang Neuber (Leiden: Brill, 2005), pp. 9–32.

⁹⁵ See Richard J. Oosterhoff “‘Secrets of Industry’ for ‘Vulgar Men’: Early French Readerships of Technical Print,” in *Translating Early Modern Science*, ed. Sietske Fransen and Niall Hodson (Leiden: Brill, *forthcoming* 2016).

where the *amateur* was central.⁹⁶ Indeed, *amateurs* had been theorised. Abraham Bosse already associated the *curieux* with acquisition, while eighteenth-century theorists made the *amateur* the arbiter of refined taste.⁹⁷ From a position of strength, the language of *amateurs* now enforced distinctions.

⁹⁶ E.g. Charles Perrault's *Parallèle des Anciens et des Modernes*, 4 vols. (Paris, 1688-96), which separates *les sciences* from *les beaux arts* in a final volume. Eighteenth-century currency is discussed in Charlotte Guichard, *Les amateurs d'art à Paris au XVIIIe siècle* (Paris: Champ Vallon, 2008). The picture is of course more complicated, as other articles in this special issue will show. One example might be the art theorist, *amateur*, and mathematician Lambert ten Kate (1674-1731), who experimented with numerical accounts of colour: Daniel Margocsy, *Commercial Visions: Science, Trade, and Visual Culture in the Dutch Golden Age* (Chicago: University of Chicago Press, 2014), pp. 178–184.

⁹⁷ Abraham Bosse, *Sentimens sur la distinction des diverses manières de peinture, desseins et graveure, et des originaux d'avec leurs copies* (Paris: Abraham Bosse, 1649), pp. 3, 17 *et passim*. For one set of distinctions, see Rochelle Ziskin, *Sheltering Art: Collecting and Social Identity in Early Eighteenth-Century Paris* (University Park, PA: Pennsylvania State Press, 2012), pp. 205–206.